MILITARY SPECIFICATION SHEET

ELECTRON TUBE, VIDICON

TYPE 7290

The complete requirements for procuring the electron tube described herein shall consist of this document and the issue in effect of Specification MIL-E-1.

This specification is approved for use by all Departments and Agencies of the Department of Defense.

DESCRIPTION: One-inch, for slow scan or delayed readout, magnetic focus and deflection.

PIN CONNECTIONS AND DIMENSIONS: See figure 1.

ABSOLUTE RATINGS:

Parameter: (See note 1)	Ef	Esj	Ec1	Ec2	Ec3
Unit:	V	Vdc	Vdc	Vdc	Vdc
Maximum:	6.9	25	125	750	1,000
Minimum:	5.7	---	0	---	---
TEST CONDITIONS:	6.3	15	Adjust (See note 2)	300	Adjust (See note 3)

ABSOLUTE RATINGS:

Parameter: (See note 1)	Ehk	FI	T(Faceplate)	tk	I (Focus coil)
Unit:	Vdc	ft-c	°C	sec	mAdc
Maximum:	10, -125	1,000	45	---	----
Minimum:	---	---	10	---	----
TEST CONDITIONS:	---	---	30	300	40

TEST PATTERN: See note 4

TEST RASTER: See note 5

TEST COMPONENTS: See note 6

GENERAL:

Qualification - Required

Holding period - (t = 336 hours)

METHOD	REQUIREMENT OR TEST	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	SYMBOL	LIMITS		UNIT
						Min	Max	
	Qualification							
1331	Direct-interelectrode capacitance	Target to all	---	---	C	3.5	5.5	pf
	Quality conformance inspection, part 1							
----	Alinement horizontal	See notes 7, 8, and 9	0.65	II	---	-30	+30	mAdc
----	Alinement vertical	See notes 7, 8, and 9	0.65	II	---	-30	+30	mAdc
----	Cutoff	FI = 0.6 ft-c See notes 7, 8, and 13	0.65	II	Ec1	-45	-100	Vdc
----	Center resolution (1)	FI = 0.6 ft-c See notes 4, 7, 8, and 10	0.65	II	---	600	---	Lines
----	Center resolution (2)	See notes 4, 8, 16, 20 and 21	0.65	II	---	600	---	Lines
----	Corner resolution	FI = 0.6 ft-c See notes 4, 7, 8, and 11	0.65	II	---	350	---	Lines
----	Spurious signal	FI = 0.6 ft-c See notes 7, 9, 12, and 23	0.65	II	---	---	---	---
----	Signal electrode voltage	See notes 7, 8, 14, and 23	0.65	II	Esj	---	25	Vdc
----	Maximum dark current	FI = 0 ft-c; Esi = 25 V See notes 7, 8, and 23	0.65	II	DIsj	---	.0005	μAdc
----	Sensitivity (1)	FI = 0.6 ft-c See notes 7, 8, 15, and 23	0.65	II	Isj	.04	.08	μAdc
----	Sensitivity (2)	See notes 7, 8, 16, and 21	0.65	II	Isj	.0005	.001	μAdc
----	Raster burn	Esj = 25 V; FI = 0 ft-c See notes 7, 8, 17, and 23	0.65	II	---	---	---	---
----	Maximum grid 2 current	Esj = open; Ec1 = 0 Vdc; Ec3 = 250 Vdc See note 23	0.65	II	Ic2	1000	---	μAdc
----	Residual signal	See note 19	0.65	II	Lag	---	20	%
	Quality conformance inspection, part 2							
1301	Heater current		6.5	S3	If	540	660	mA
1105	Permanence of marking		---	---	---	---	---	---
----	Life-test provisions	Group D See note 18 t = 500 hours	---	---	---	---	---	--
	Life-test end point:							
----	Maximum grid 2 current		---	---	Ic2	900	---	μAdc
1136	Container drop (periodic check)	See note 22	---	---	---	---	---	---

NOTES:

1. The symbols used in this specification, in addition to those in MIL-E-1, are defined as follows:

   Lag = Percentage of initial value of signal-output current remaining after a specified time period following removal of illumination.
   Esj = Target voltage
   Isj = Signal-output current
   DIsj = Dark current
   FI = Faceplate illumination
   T(Faceplate) = Temperature of faceplate
   I(Focus coil) = Focus coil current
   IsjT - Target current

2. Ec1 shall be adjusted until the beam current is just sufficient to discharge the photo-layer as observed by presence of detail in the highlights of the monitor.

3. Grids 3 and 4 are connected together internally. The voltage applied to these two elements shall be referred to as Ec3. Ec3 voltages apply with the use of Cleveland Electronics No. VF-115-4A focusing coil and Cleveland Electronics yoke MVVL 155-1, or equivalent, producing a field strength of approximately 40 gausses. Ec3 and optical focus shall alternately be adjusted to obtain best focus (sharpest lines).

4. EIA resolution chart, 1956, or equivalent, shall be placed on a transparent slide and shall be illuminated from the rear of the slide.

5. Standard EIA (RETMA) television scan shall be employed. The scan size shall be 1/2 x 3/8 inch.

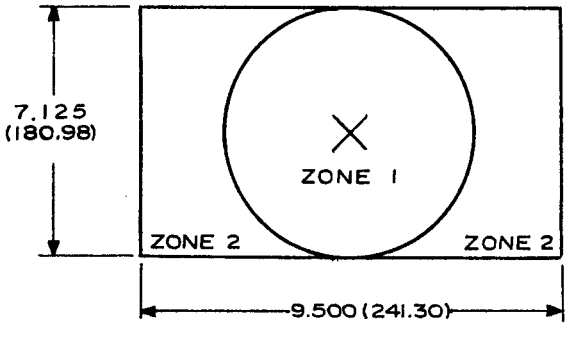
6. Test components:

   (a) Deflection yoke - MVVL 155-1 Cleveland Electronics, or equivalent.
   (b) Focusing coil - VF-115-4A Cleveland Electronics, or equivalent.
   (c) Alinement coil - VA-132 Cleveland Electronics, or equivalent.
   (d) The above components are mounted as shown in figure 2.

7. The tube shall be tested in camera with associated monitors as shown in the block diagram of figure 3.

8. The alinement coil currents of each horizontal and vertical coil shall be adjusted until the center of the test pattern remains stationary as Ec3 is varied in and out of focus. The alinement coil currents shall be within the specified limits.

9. The following "back illuminated" test pattern shall be used when performing this test:



NOTES: -Continued

10. With Ec3 adjusted for balanced horizontal and vertical resolution, the resolution in the center of the pattern shall exceed the specified limit at 30 frames per second scan rate.

11. With Ec3 adjusted for balanced horizontal and vertical resolution, the resolution in the 4 corners of the pattern shall exceed the specified limit at 30 frames per second scan rate.

12. Using the spurious signal chart as described in note 9, consider the inner circle area as zone 1 and the area within the rectangle excluding the inner circle as zone 2. The maximum size of any blemish, spot, or smudge and maximum allowable in any zone are as follows:

METHOD I	METHOD II	NUMBER ALLOWED	
Measurement in inches using a monitor with 10 x 7 1/2-inch raster	Number of raster lines	Zone 1	Zone 2
Over 0.0312	Over 2	None	None
0.0312 to 0.0156	2 to 1	1	3
Under 0.0156	1	See note A	See note A

Note A. Do not count spots 0.0156 and under unless concentration causes a smudge.

13. With test conditions as indicated, remove blanking voltage from Grid 1 and adjust Ec1 until test pattern just disappears as observed on monitor.

14. Adjust Esj to 25V at faceplate illumination of 1.0 foot candles. The displayed information should be identical to that at 15V except for signal level and white spots. Close the lens and overscan the target. There should be no black areas observable on the monitor.

15. Adjust faceplate illumination to the specified value, and project on vidicon target. The lamp current of the light source shall be adjusted for a color temperature of 2,870°K. Sensitivity is the target current these conditions minus dark current. (Scan rate 30 frames per second)

16. Sensitivity (2). With an exposure time of 1/25 th of a second and a faceplate illumination of 1.25 foot candles, the signal output current shall exceed the value specified when scanned by a 1/2-inch by 3/8-inch raster at 60 cps horizontal and 1/6 cps vertical rate.

17. Raster burn test.

    (a) With conditions for 1/2 x 3/8 inch scan, completely overscan target and increase bias until complete target is discharged.

    (b) Set black level at the value where no part of the dark current signal is clipped.

    (c) Increase monitor bias until complete target is just visible.

    (d) Reject if raster burn is lighter than surrounding area. Reject for any permanent image burn.

NOTES: -Continued

18. Life-test conditions:

    (a) Adjustment for scan size is made by the use of a tube similar to the tube under test except that the tube has a phosphor screen with 300 Vdc applied to the target.

    (b) With the scan size adjusted to approximately 1/2 x 3/8 inch (do not allow scanned area to touch target ring), faceplate temperature of 30 +5°C, adjust Ec1 to obtain 0.5 mAdc of grid 2 current. Cover left half of faceplate (looking into tube face with key pin up) with black tape, and adjust target voltage (Esj) to 25 V with no light incident on the faceplate.

    (c) Adjust the incident illumination on the faceplate to 0.1 μAdc target current (IsjT), (Light plus dark current).

    (d) The incident illumination shall be readjusted for specified target current within 24 hours after the tube has reached the specified operating temperature.

19. Residual signal. With the tube setup and exposed as described in note 16, the output signal amplitude during the second frame readout after exposure shall not exceed 20 percent of the signal amplitude during the first frame readout.

20. Center resolution (2). With the tube setup in equipment capable of obtaining a 6 second frametime and with Ec3 adjusted to obtain balanced horizontal and vertical resolution, the resolution in the center of the pattern shall exceed the specified limit.

21. The tube shall be tested in camera with associated monitors as shown in figure four (4).

22. This test is not required for qualification approval.

23. This test to be performed at the conclusion of the holding period.

Custodians:

Army - EL
Navy - EC
Air Force - 80

Review activities:

Army - EL
Navy - EC
Air Force - 11, 17

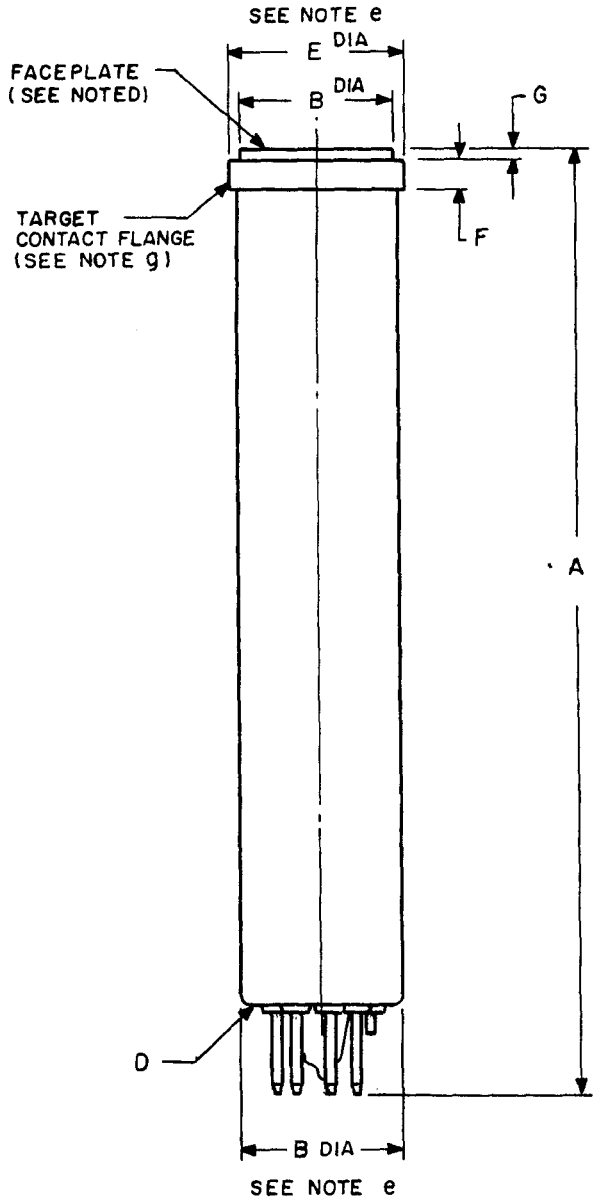
User activities:

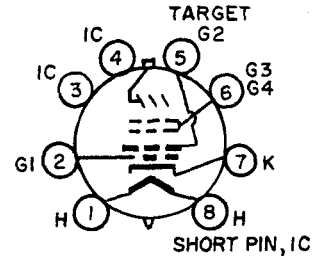
Navy - WP, MC, CG
Air Force - None

Preparing activity:

Air Force - 80

(Project 5960-2585)





BASING DIAGRAM

DIMENSIONS				
LTR	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
QUALIFICATION INSPECTION				
D	BASE:-E8-11 (SEE NOTE f)			
QUALITY CONFORMANCE INSPECTION, PART I				
A	6.120	6.380	155.45	162.05
B	.990	1.045	25.15	26.54
E	1.116	1.132	28.35	28.75
NOMINAL DIMENSIONS (SEE NOTE b)				
F	.175		4.45	
G	.050		1.27	

NOTES:

a. METRIC EQUIVALENTS (TO THE NEAREST .01 MM) ARE FOR GENERAL INFORMATION ONLY AND ARE BASED UPON 1 INCH = 25.4 MM.

b. THESE DIMENSIONS ARE FOR INFORMATION ONLY AND ARE NOT REQUIRED FOR INSPECTION PURPOSES.

c. THE AQL FOR THE COMBINED MECHANICAL DEFECTIVES IN QUALITY CONFORMANCE INSPECTION, PART I, SHALL BE 1.0 PERCENT.

d. DIRECTION OF INCIDENT LIGHT IS INTO FACE END OF TUBE.

e. CONCENTRICITY AND CAMBER OF TUBE SHALL BE DETERMINED BY GAGE SHOWN ON FIGURE 2.

f. FOR PIN ALINEMENT, USE GAGE GE8-2.

g. TARGET CONTACT FLANGE IN FORM OF METAL RING, AND WITH DIAMETER AS SPECIFIED FOR DIM. 'E', MAY BE LOCATED ALONG TUBE AXIS IN ANY PART OF, OR ALL OF, SPACE BETWEEN DASHED LINES.

FIGURE 1. Outline drawing of electron tube type 7290

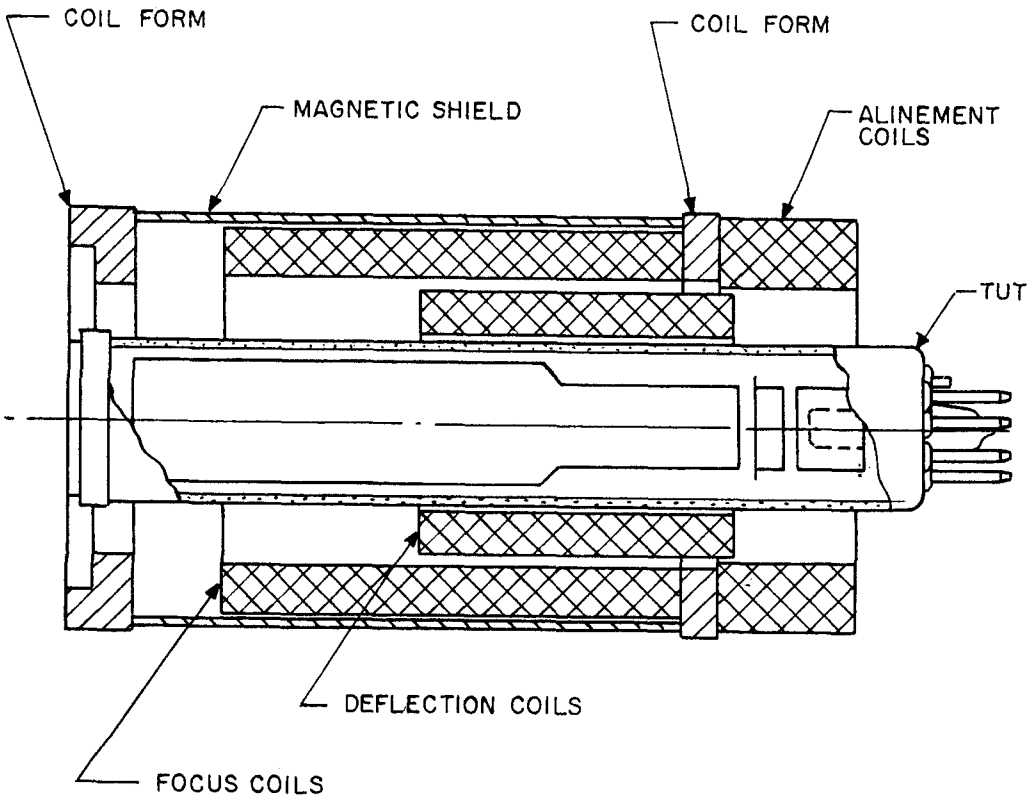
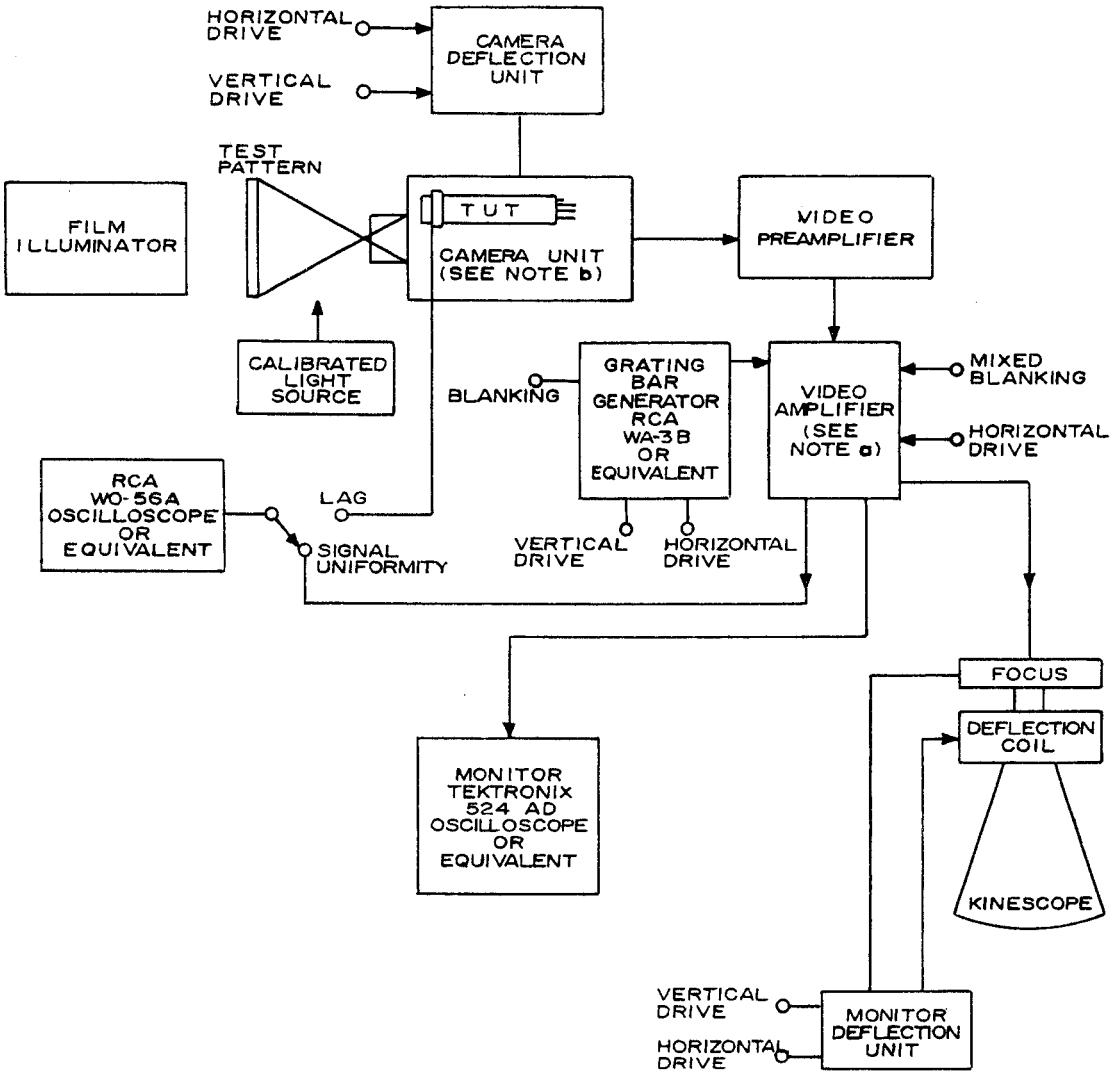


FIGURE 2. Test components for electron tube type 7290



NOTES:

a. VIDEO AMPLIFIER REQUIREMENTS :

1) BANDWIDTH (FREQUENCY RESPONSE) - NOMINAL RESPONSE OF VIDEO CHANNELS SHALL BE FLAT WITHIN ± 3 db TO 15 M

2) GAIN - APPROXIMATELY 40 db (LINEARITY SHALL BE WITHIN 10).

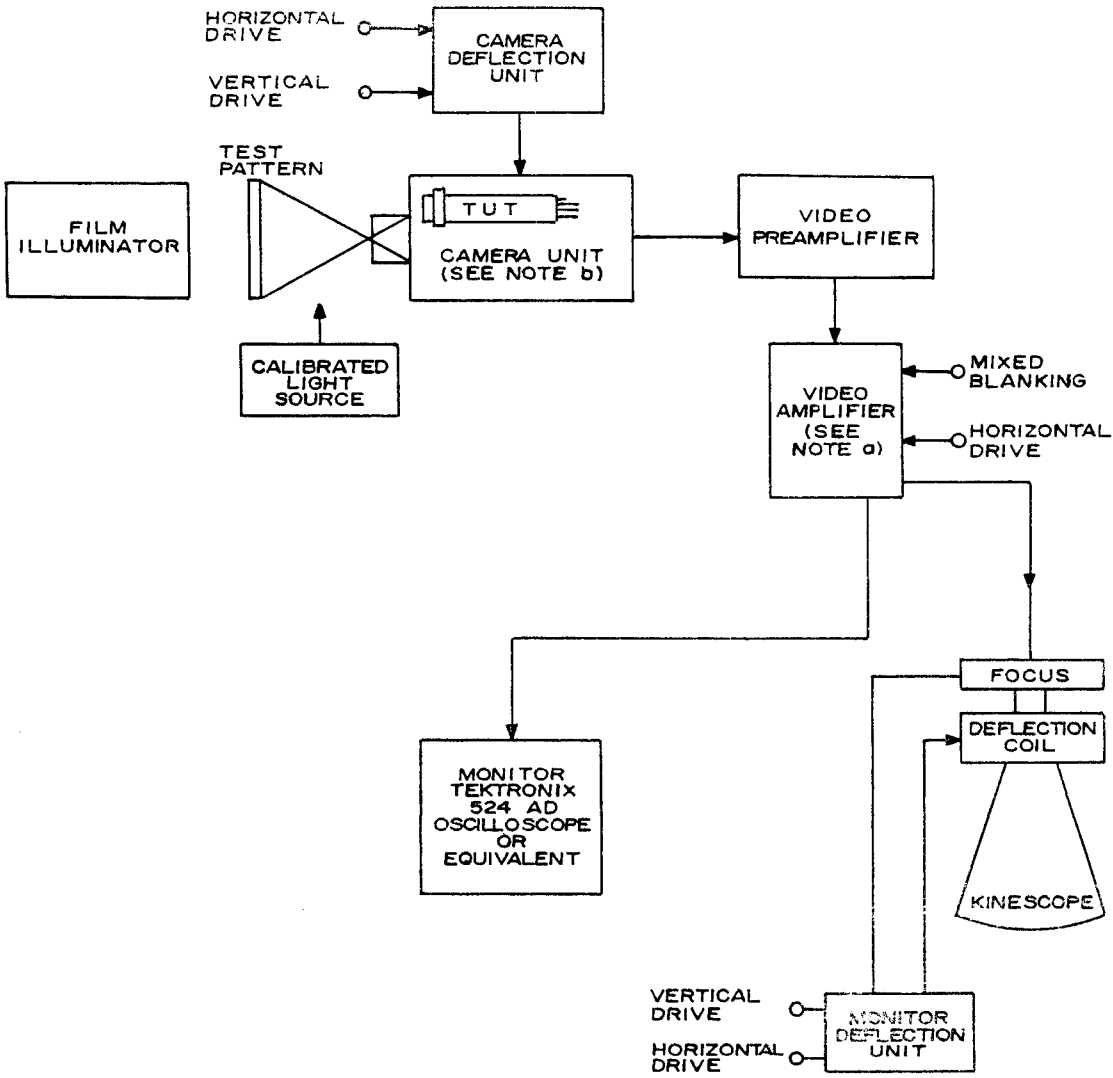
3) INPUT SIGNAL - 0.5 VPP WHERE BLACK IS NEGATIVE.

4) FREQUENCY DISTORTION (AMPLITUDE AND PHASE) SHALL NOT EXCEED ± 2.0 PERCENT TILT AT EITHER VERTICAL OR HORIZONTAL RATE.

b. CAMERA UNIT REQUIREMENT:

BOTH HORIZONTAL AND VERTICAL SCANNING LINEARITY SHALL BE WITHIN 1.0 PERCENT.

FIGURE 3. Block diagram of test equipment for electron tube type 7290



NOTES:

a. BANDWIDTH (FREQUENCY RESPONSE) - FLAT WITHIN ± 3 db TO 2.5 MHz.

b. VERTICAL FREQUENCY 1/6 Hz.
HORIZONTAL FREQUENCY 60 Hz, 2 m sec. BLANKING INTERNAL.

FIGURE 4. Block diagram of slow scan test equipment for electron tube type 7290

☆U.S. GOVERNMENT PRINTING OFFICE:1972-714-537/1501